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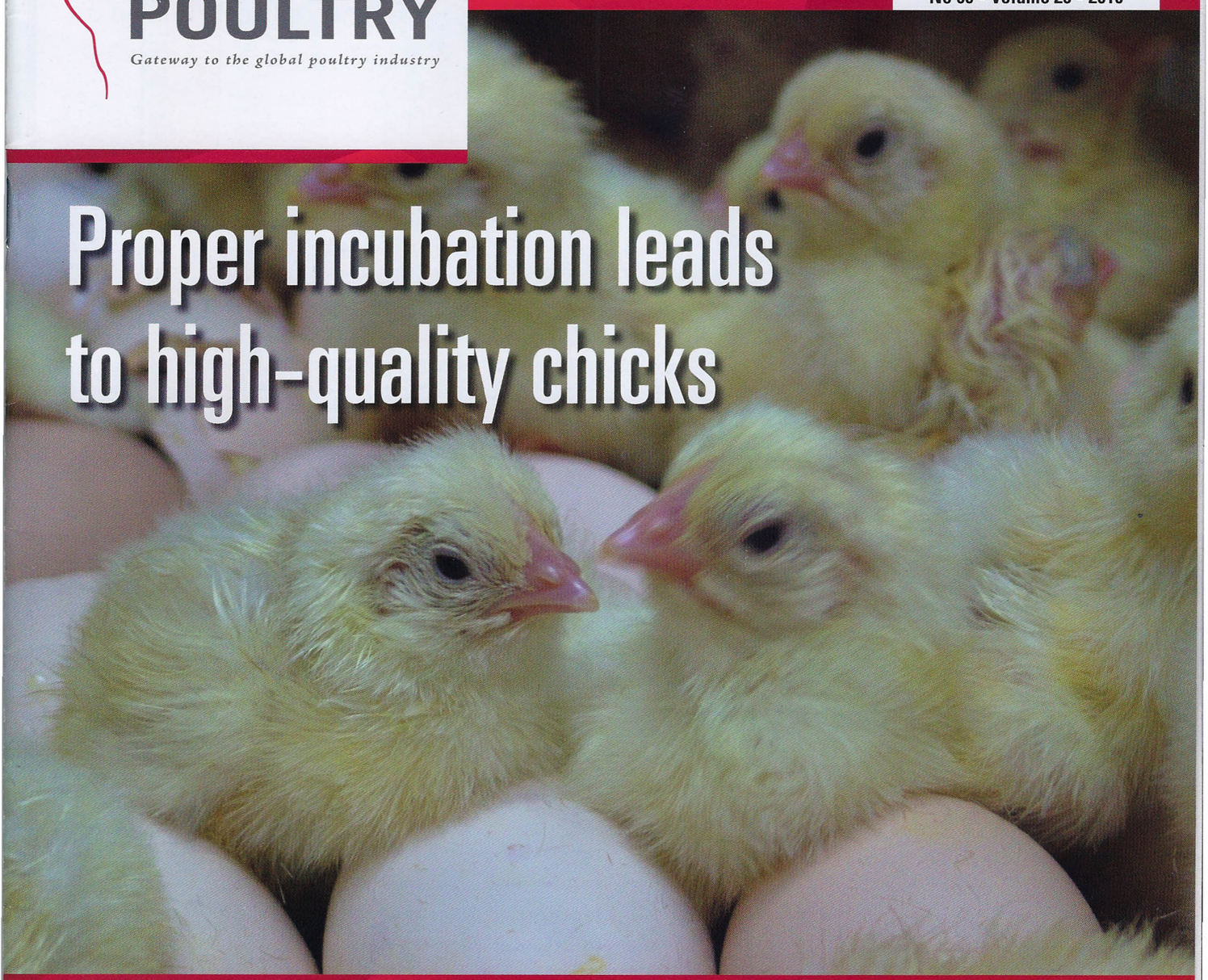

Vaccination Index improves Elisa results

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Vaccination Index: A new approach to evaluate Elisa

A good immune response is the logical and desired result when vaccinating a poultry flock. Elisa serology has proven to be a useful tool to measure the effectiveness of vaccination. The Vaccination Index (VI) is a new approach to make the evaluation of Elisa vaccination results easier and more complete. The VI will give a high score for good vaccination results and a low score for poor results.

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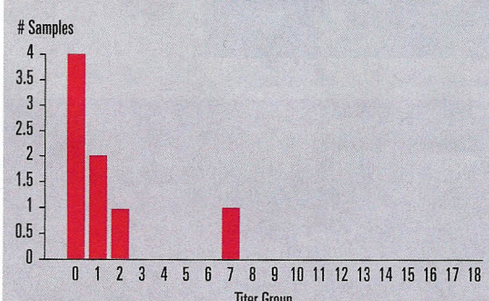
The use of Elisa serology in poultry health management is a useful tool to monitor immune response of the flock following vaccination. The veterinarian often judges the success of a vaccination by looking at two major components of a vaccination response, being the Mean Titer response (mean antibody level of a flock), and % CV (value that measures uniformity). As the relationship between Mean Titer and % CV is important for evaluating vaccine responses, the idea was born to look at the ratio between the two components and express the

Figure 1 - Vaccination Index (VI) example of NDV normal flock results



Details Vaccination Program:

Vaccine	Method	Age Vacc. Batch/Applicator
Avinew	Coarse Spray	01D
Avinew	Dr Water	20D /

Assay:	NDV	**Lot:**	FS4708
Bleeding Date:	06/02/2008	**Testing Date:**	07/02/2008

Mean Titer:	2255		
Min. - Max Titer:	795	–	8205
G.M.T.:	1607		
%CV:	110		
Target Titer:	1000	–	4000
Target %CV:	40	–	70
VI Index:	21		
VI Target Range:	50	–	250
Interpretation VI Index:	LOW		

Titer Range Ref. Controls:	R7(7000–11000)
Mean Titer Ref. Controls:	R7 = 7868

Table 1 - Vaccination Index (VI) results for live IBV vaccinated broilers at 35-45 days

Vaccination programme	VI Normal	VI Clinical infection
H120, IBprimer, Ma5	10-90	>100
H120 + CR88 or 4/91	50-200	>200

Table 2 - Vaccination Index (VI) results for live NDV vaccinated broilers at 35-45 days

Vaccination programme	VI Normal	VI Clinical infection
Up to 3x live Clone 30, VH, HB1, La Sota, Avinew, NDW	20-250	> 300
Inact 01D + 3x live	50-280	> 300

relationship in a new parameter – the Vaccination Index (VI):

$$VI = \frac{(\text{Mean Titer})^2}{(\text{St Dev} \times 100)} = \frac{\text{Mean Titer}}{\%\ \text{CV}}$$

The VI appears to be a logical parameter as it is expected to give a high score in the case of good vaccination (high Mean Titer, low % CV) and a low score in the case of poor vaccination (low Mean Titer, high % CV).

Tested in broilers and breeders

In order to test the VI concept, vaccination results from flocks were examined after live IBV and NDV vaccination. The VI for all of the flocks was calculated for healthy non-infected flocks and for confirmed clinically infected flocks after live and/or inactivated vaccination.

In total, over 500 individual broiler flock results for BioChek Elisa were examined following different live IBV, NDV, and IBD vaccination schedules. Also, before- and post-infection titer results were compared for IBV from three broiler breeder flocks after live priming and inactivation.

Selection of flocks was based on the following criteria:

1. Mean titers in expected range for normal flocks and significantly elevated titers for clinically infected flocks.
2. Presence and absence of clinical symptoms to differentiate between normal healthy flocks and clinically infected flocks.
3. Reference controls must be used and must be in range, indicating proper reproduction of Elisa titers.

The results are summarised in *Table 1* for IBV, *Table 2* for NDV, *Table 3* for IBD in broiler flocks, and *Table 4* for broiler breeder flocks.

Valuable information

The data mentioned in the tables shows that the VI can be helpful for the veterinarian to differentiate between:

1. Good vaccination responses (high VI score) and poor vaccination responses (low VI score).
2. Normal vaccination responses and possible field challenges of vaccinated flocks.

Traditional Elisa evaluation of vaccination responses includes the comparison of obtained Mean Titer results with the expected mean titers after vaccination, the so-called "vaccination baselines". As the VI score takes Mean Titer response and % CV into account, it can make serological Elisa evaluation of vaccination more simple and complete than looking at "baseline titers" alone.

The VI score also has a logical dimension in that increasing scores indicate better and stronger immunological responses after vaccination and/or infection.

Although the data shows that excessive VI scores seem to correlate with the presence of a field challenge after vaccination, it should be stressed that VI scores alone cannot be used to establish diagnosis. Diagnosis can only be established when one combines VI scores with clinical symptoms and isolation of the pathogen and/or confirmation testing with PCR.

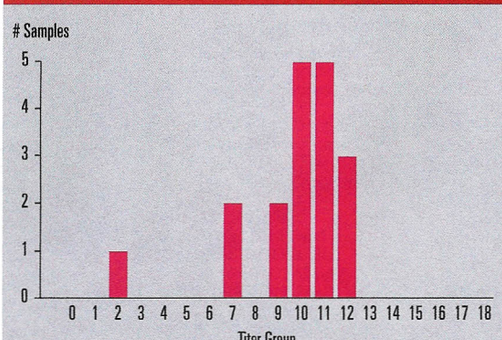
Table 3 - Vaccination Index (VI) results for live IBD vaccinated broilers at 35-45 days

Vaccination programme	VI Normal	VI Suspect infection
Bursine2, Bursine Plus 1-2x	50-300	> 300
Gallivac IBD, D78 1-2X, Avipro Precise	100-400	> 500
Cevac IBD L , Bursa F ,Hipra GM97 1-2 X	100-500	> 500
Avipro IBD extreme 1-2x	200-500	> 500
228E 1-2x	200-550	> 600
Tabic MB 1-2x	200-600	> 700
Vaxxitek @ 01D S.C./ or In-Ovo @18D incubation	10-90	> 200
Cevac Transmune IBD @ 01D S.C./ or In-Ovo @18D incubation	100-500	
Bursaplex @ 01D S.C./ or In-Ovo @18D incubation	100-500	

Table 4 - Vaccination Indexes (VI) of live primed and inactivated IBV vaccinated broiler breeder flocks before and after IBV infection. Age of flocks before infection was 34-52 weeks. Post-infection titers were taken at 3-6 weeks after first clinical symptoms.

Mean Titer		% CV		VI	
Before infection	After infection	Before infection	After infection	Before infection	After infection
4850	16036	75	38	65	425
5288	15145	46	15	115	1010
5937	23456	58	28	102	838

Figure 2 - Vaccination Index (VI) example of NDV infected flock results



Assay: NDV Lot: FS4829
Bleeding Date: 10/11/2008 Testing Date: 11/11/2008

Mean Titer:	15171		
Min. - Max Titer:	2589	–	21004
G.M.T.:	14020		
%CV:	31		
Target Titer:	1000	–	4000
Target %CV:	40	–	70
VI Index:	489		
VI Target Range:	50	–	250
Interpretation VI Index:	HIGH		

Details Vaccination Program:

Vaccine	Method	Age Vacc. Batch/Applicator
AVINEW	Coarse Spray	01D
AVINEW	Coarse Spray	14D /

Titer Range Ref. Controls:	CR(9000–15000); R7(7000–11000)
Mean Titer Ref. Controls:	CR = 11197; R7 = 8921